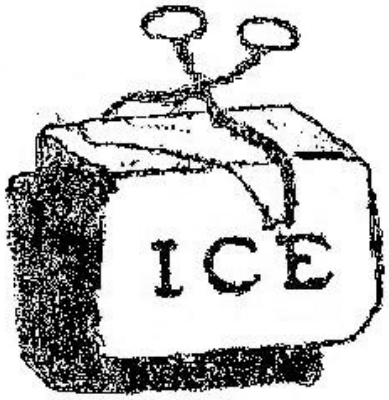
Ice Cream

People have been enjoying frozen treats for centuries, but home freezers didn't become available until the 1940s. How did people make ice cream before they could buy and store it?



What you will need:

- 1/2 cup milk or cream
- 1 tbsp sugar
- 1/8 tsp vanilla
- 4 cups ice
- 4 tbsp salt
- Two plastic bags
- One leak-proof container (like a Tupperware or glass jar with rubber seal)

Make your Ice Cream

1. Put the ice and salt into a leak-proof container. Seal it, shake it up, and set it aside . It will start to liquify—don't worry!
2. Put the milk, sugar, and vanilla into a zip-lock plastic bag and seal. Shake to mix.
3. Open the mixture's bag to squeeze out the air. Reseal and place inside another bag. Remove as much air as you can again and seal that one.
4. Place the bags into the leak-proof container. Seal the container and shake for 15-20 minutes.
5. Enjoy! Note how this ice cream a little different from what we buy today.

How does this work?

Making ice cream is science in action! Water freezes at 32 degrees, which isn't cold enough to help freeze anything else. When you add salt to ice, a chemical reaction takes place that lowers the water temperature below its freezing point. Grab a thermometer and place it in your salt water mixture to test this.

Surface area is also important. Surface area is the outer-most part of something. The more the liquid ice cream comes in contact with the cold salt water mixture, the faster it will freezer. Experiment with how you seal the ice cream mixture in its bag. Do you have more surface area when the liquid pools at the bottom of the bag? Or when you lay the bag as flat as possible? Which way helps the ice cream freeze faster?

After making ice cream, you've probably noticed it took a lot of work and time. It was a luxury item, something only wealthier people could afford. We know George Washington's Mount Vernon and Thomas Jefferson's Monticello both had ice houses. Dozens of enslaved men worked long days to fill the ice house in the winter, and then enslaved chefs and kitchen assistants spent hours making the ice cream in metal cannisters and wooden bowls instead of plastic bags and containers.

Take it further!

Before electric freezers, people used things in nature to keep food and drinks chilled. To really get things cold, you used an ice well or ice house to store the ice. Gadsby's Tavern Museum has an ice well that could hold over 60 tons of ice, and it was designed to minimize heat transfer so the ice would last.

Heat energy is lost, or "transferred" (because it goes somewhere!) in three different ways:

1. Conduction—objects touching each other, like an ice cube melting in your hand
2. Convection—movement of a group of molecules, like a current of air
3. Radiation—electromagnetic waves, like the sun warming your face

To make ice last, it needs to be insulated to limit the amount heat transfer occurring. How can we insulate ice to limit melting? To test this, gather the following:

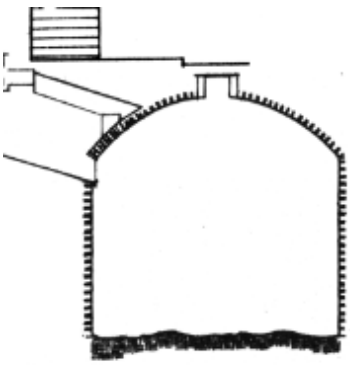
Time passed	Control	_____
10 min.		
20 min.		
30 min.		
40 min.		
50 min.		
60 min.		

1. Small containers and one ice cube for each container.
2. A variety of materials from around the house or outside to use as insulation. Suggestions include: washcloth, cotton balls or pom poms, bubble wrap, straw or grass, mulch, pebbles, etc.
3. For each container, select one or more items to place the ice cube in for insulation. Keep one container with just an ice cube and no insulation as a control.
4. Check the containers every 10 minutes and record how much of the ice is left. The simple chart is a template for recording results observations.

When you only have one ice cube left, end the experiment and discuss your results.

- Which method worked best?
- Why do you think it worked better than the others?

Check out the ice well of Gadsby's Tavern Museum, at the corner of Cameron and Royal Street.



Note the details that helped it insulate ice:

- It is underground, away from the sun.
- The bottom has a drainage system, so ice doesn't sit in water.
- The roof is curved so condensation drips down walls, away from the ice.